

TRUSSELATOR - On-Orbit Fabrication of High Performance Support Structures for Solar Arrays, Phase II

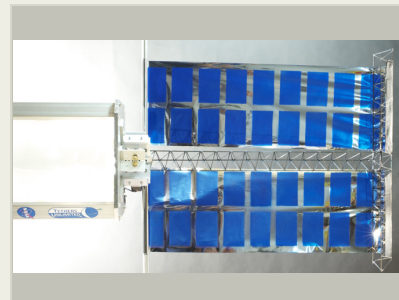
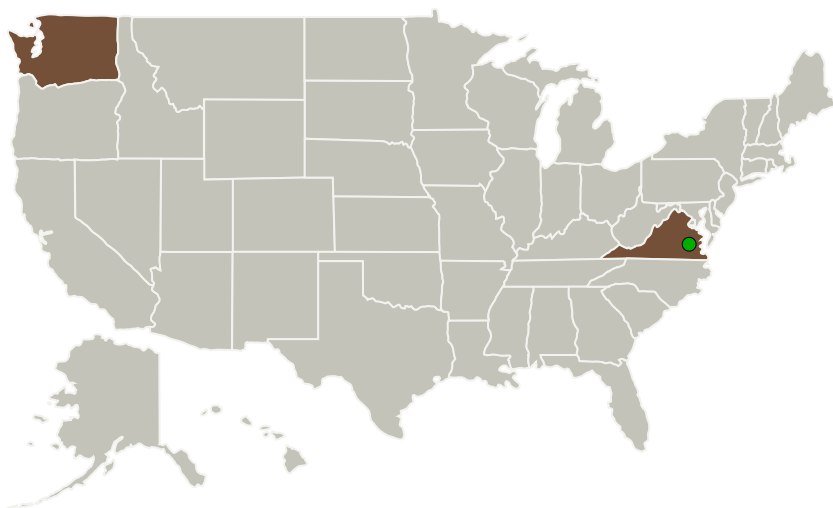
Completed Technology Project (2014 - 2016)



Project Introduction

The Trusselator technology will enable on-orbit fabrication of support structures for high-power solar arrays and large antennas, achieving order-of-magnitude improvements in packing efficiency and launch mass while reducing life-cycle cost. The Phase I Trusselator effort successfully demonstrated fabrication of continuous lengths of high-performance carbon fiber truss using a novel additive manufacturing process, establishing the technology at TRL-4. The initial truss samples displayed bending stiffness efficiency superior to SOA deployable mast technologies. The Phase II effort will address the key technical risks and mature the Trusselator technology to TRL-6. We will do so by first refining the additive manufacturing process elements to improve process reliability and increase structural performance of the truss products. We will then design and prototype a Trusselator capable of operation in the thermal-vacuum environment of space, incorporating design improvements to reduce weight and stowed volume. Demonstration of fabrication of multi-meter lengths of truss in a vacuum environment will establish the technology at TRL-6. We will also develop an automated process for integrating the fabricated truss with thin-film solar cell blankets, and demonstrate this process with a solar cell blanket simulator. These Phase II efforts will prepare the Trusselator for flight demonstration in Phase III efforts to enable its adoption into the critical path for flight missions requiring high-power solar arrays.

Primary U.S. Work Locations and Key Partners



TRUSSELATOR - On-Orbit Fabrication of High Performance Support Structures for Solar Arrays, Phase II Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Tethers Unlimited Inc	Lead Organization	Industry	
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Virginia	Washington

Project Transitions

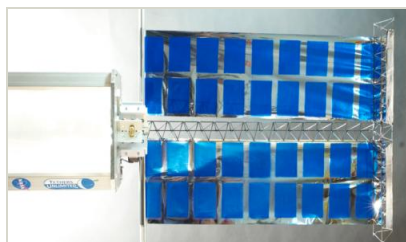
▶ **April 2014:** Project Start

✓ **April 2016:** Closed out

Closeout Documentation:

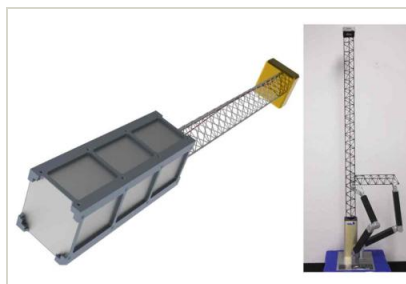
- Final Summary Chart(<https://techport.nasa.gov/file/140705>)

Images



Briefing Chart Image

TRUSSELATOR - On-Orbit Fabrication of High Performance Support Structures for Solar Arrays, Phase II Briefing Chart Image (<https://techport.nasa.gov/image/130742>)



Final Summary Chart Image

TRUSSELATOR - On-Orbit Fabrication of High Performance Support Structures for Solar Arrays, Phase II Project Image (<https://techport.nasa.gov/image/131823>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tethers Unlimited Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

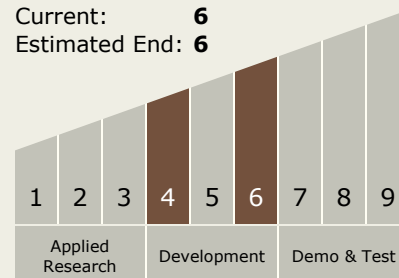
Carlos Torrez

Principal Investigator:

Robert P Hoyt

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.5 Innovative, Multifunctional Concepts

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System